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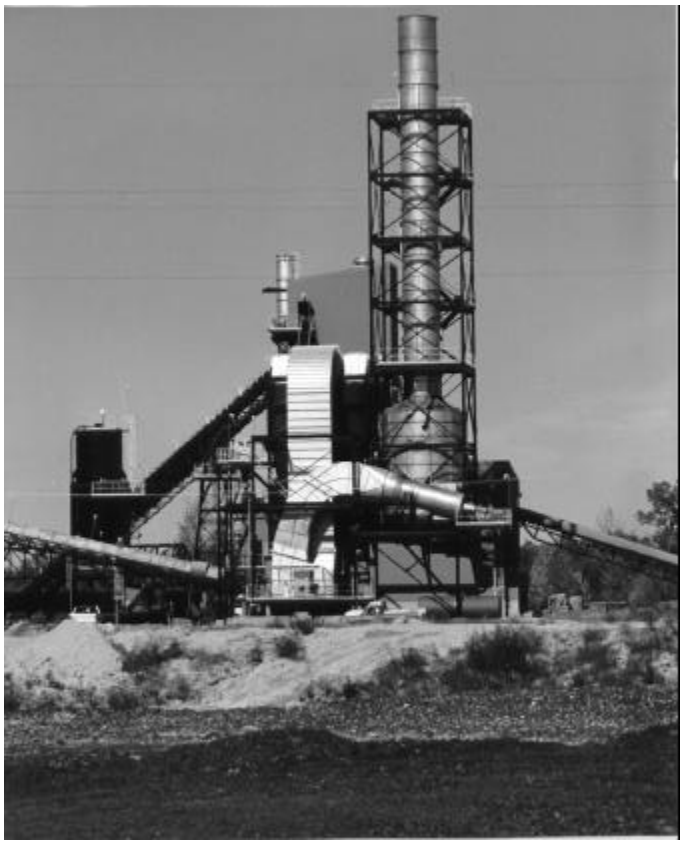
EPA Coalbed Methane Outreach Program Technical Options Series

Use of Coal Mine Methane in Coal Dryers



The thermal coal dryer at Jim Walter Resources' No. 4 Mine is capable of burning coal or natural gas
(Photo Courtesy of Jim Walter Resources, Inc.)

BENEFITS OF USING COAL MINE METHANE IN THERMAL DRYERS...

- Better heat distribution from gas firing results in reduced grate bar maintenance costs
- Reduced corrosion of wetted parts due to reduction of H_2SO_4 from firing coal
- Eliminates emission of fine particulate material resulting from coal-fired heating
- Can use medium quality gas from gob wells
- Recovery and use of coal mine methane reduces greenhouse gas emissions

Use of coal mine methane in thermal dryers can free up coal for sales, while employing coal mine gas that does not meet pipeline specifications

Why Consider Using Coal Mine Methane in Thermal Dryers?

Product moisture is usually a specification item in a coal sales contract, because reduced moisture facilitates handling during shipment, reduces heat loss during the combustion process, and decreases transportation costs. To meet these requirements, coal preparation plants ("prep plants") often use thermal dryers, which produce a heated air stream that drives off moisture from the coal. Thermal dryers typically burn coal to heat the air stream, but prep plants located at gassy coal mines may find it more economical to burn recovered coal mine methane to provide this heat.

Many preparation plants worldwide have used coal mine methane for drying coal, including those at the Pniówek Mine in Poland, the Buchanan Mine in Virginia, and the Severnaya Mine in Russia. The Buchanan Mine, for example, uses nearly 1.5 million cubic feet of coal mine methane per day for this purpose. The use of coal mine methane for coal drying has several advantages, including 1) reduced operating and maintenance costs; 2) freeing-up of additional coal for sale; and 3) reduction in SO_2, NO_x, and particulate emissions to the atmosphere. The economic viability of burning coal mine methane in a thermal dryer may vary depending on the market for the gas, value of coal being substituted by gas, and the current value of emission credits being saved by burning gas. An added benefit is that the use of coal mine methane reduces emissions of this greenhouse gas to the atmosphere.

Operational costs of thermal dryers are reduced 10% by using gas burners

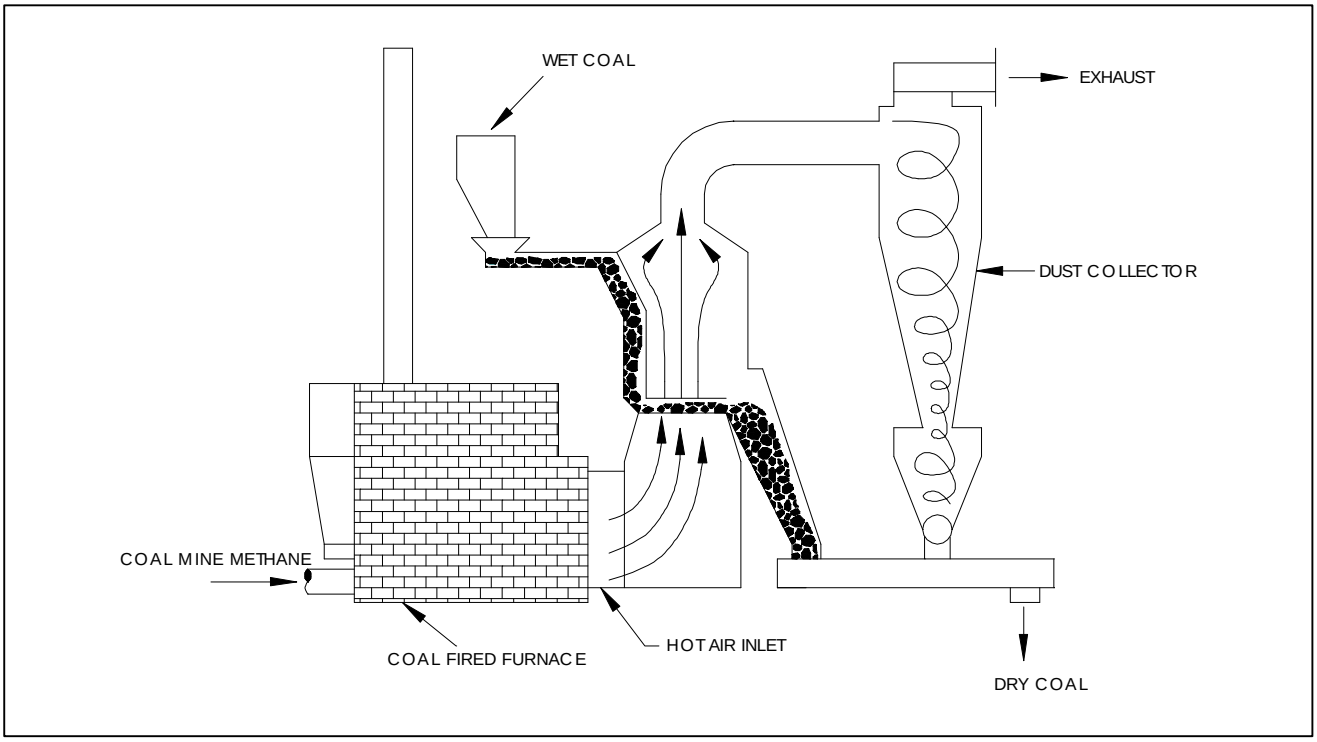
The two principle methods of drying coal are through mechanical or thermal processes. The mechanical process typically employs a centrifugal device that generally dries the coal to about a 12% moisture content. Since many coal sales contracts require lower moisture contents, thermal dryers are more widely used, as they are capable of drying coal to a 3-6% moisture content. There are several types of thermal coal dryers, including rotary direct dryers, fluidized direct dryers, flash dryers, and indirect coal dryers, all of which use combustion burners to produce hot air or steam for drying coal.

In order to adapt an existing coal-fired thermal dryer to operate on coal mine methane, the primary modification would be the addition of one or more gas burners. Rather than removing the coal-firing equipment from the dryer, the prep plant could leave it in place, providing the option to fire either type of fuel.

Using coal mine methane as fuel reduces SO_2, NO_x, and greenhouse gas emissions

The amount of methane that a thermal dryer requires depends on the amount of water that must be evaporated. This, in turn, depends on the amount of coal fed to the dryer and the percentage of water in the dried product, which can vary widely from site to site. For illustration purposes, however, drying one short ton of coal at 3% moisture in a fluidized direct dryer requires about 400,000 Btu of thermal energy. In order to dry 380 short tons of coal per hour (9,120 short tons per day), the dryer would require about 3.7 mmcf of methane per day, or about 156 tons of coal per day in fuel. The dryer also requires nearly 2 MW of electricity to operate.

COAL MINE METHANE IN THERMAL DRYERS



In addition to using coal mine methane to supply thermal energy to dry the coal, prep plants can use it to generate the electricity needed to convey, feed and pulverize the coal being dried. A typical 380 ton per hour coal dryer requires nearly 400,000 Btu of thermal energy and 2 MW of electricity to operate.

Use of Coal Mine Methane at the Severnaya Mine Coal Preparation Plant

In Russia's Vorkuta Coal Basin, the Severnaya Mine coal preparation plant uses coal mine methane in its coal dryer. In 1995, the mine recovered more than 350 million cubic feet of methane for use in the drying unit. Mine management reports that the use of coal mine methane improved the dryer's efficiency, reliability, and ease of use, and saves nearly 25 thousand short

Using coal mine methane lowers particulate emissions, which reduces the overall load on the coal dryer's pollution control equipment. The use of coal mine methane to fuel thermal dryers can also free up additional coal for sales. This would be particularly attractive to coal prep plant operators that currently burn saleable, higher quality coal in their thermal dryers.

ESTIMATED COST OF INSTALLING GAS COFIRING EQUIPMENT IN THERMAL DRYERS ($US)

Two burner assemblies	250,000
Electric motors and starters	5,000
Constant gas pilots	10,000
Delivery	10,000
Installation and Engineering	125,000
Total	**400,000**

For More Information...

Many gassy coal mines are seeking ways to utilize gob gas that does not meet pipeline specifications. Coal mines with prep plants on site or nearby may find that gob gas provides an ideal alternative to coal for fueling thermal dryers.

To obtain more information about the potential for using gas in thermal coal dryers, contact:

Ike Miller
Roberts & Schaefer Company
Central Operation
120 South Riverside Plaza
Chicago, Illinois 60606
(312) 236-7292
Fax: (312) 726-2872

Or contact EPA's Coalbed Methane Outreach Program for information about this and other profitable uses for coal mine methane:

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EPA COALBED METHANE OUTREACH PROGRAM

http://www.epa.gov/coalbed